



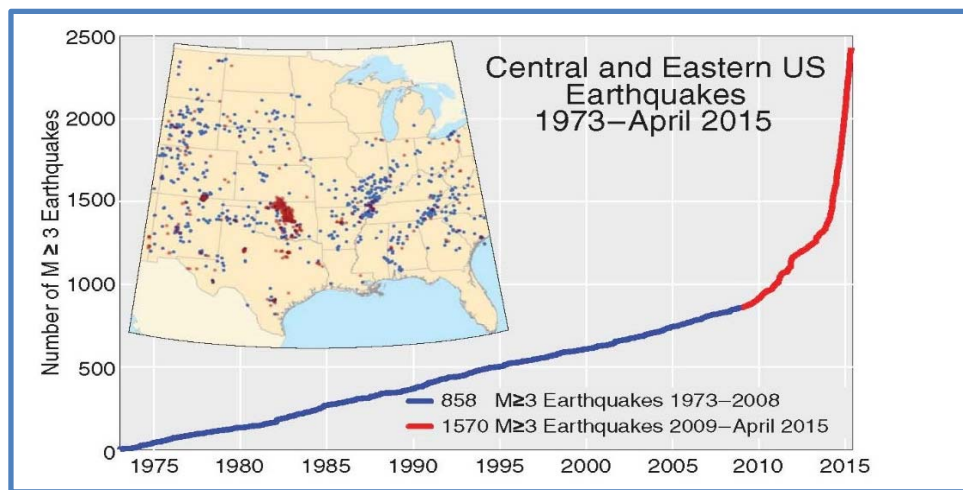
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Rapid Assessment of the Earthquake Effects on Aboveground Storage Tanks

Abstract: The presentation introduces the Seismic design process for aboveground storage tanks (ASTs), presents the results of evaluation based on a recent M4.5 earthquake in Oklahoma, discusses effects of Earthquakes on ASTs, identifies certain Life Line engineering considerations specific to AST terminals and recommends earthquake preparedness approaches that can be used by terminal owners.

The issue



Introduction:

Following the October 10, 2015 M4.5 earthquake at Cushing, Oklahoma—considered the pipeline crossroads of the world—there was a compelling need to understand seismic effects on storage infrastructure. In response, Matrix PDM Engineering performed a limited analysis of the response of a representative tank sets in Cushing using an innovative approach to rapidly assess seismic response of aboveground storage tanks based on peak ground accelerations. The results were presented to a consortium consisting of terminal owners/operators, Federal, state and local government and regulatory authorities and local Chamber of Commerce representatives.

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OKLAHOMA

Economy, Energy, Natural Resources: Policy to People

Oil Company Makes New Quake Plans After Shaking Near U.S. Storage Hub in Oklahoma

NOVEMBER 24, 2015 | 10:49 AM
BY JOE WERTZ



JOE WERTZ / STATEIMPACT OKLAHOMA

Tanker trucks unloading oil at a Phillips 66 terminal in Cushing, Okla., home to the largest commercial crude oil storage in the U.S.

Phillips 66, a refiner with 700,000 barrels of storage capacity in Cushing, Okla., "has overhauled how it plans for earthquakes, a sign U.S. energy companies are starting to react to rising seismicity around the world's largest crude hub," Reuters' **Liz Hampton reports**.

The changes include new protocols for inspecting the health of crude tanks, potentially halting operations after tremors, and monitoring quake alerts.

The revisions, fully implemented in 2015 and first detailed to Reuters this past week, appear to mark the most significant acknowledgement by a major energy company that its seismic procedures were recently updated.

They also come as some researchers say tougher standards for energy infrastructure such as pipelines and tanks could be needed to handle an uptick in quakes since 2009 in Oklahoma.

Oklahoma's **earthquake surge** has been linked to wastewater injection, the oil industry practice of pumping waste fluid byproducts of oil and gas production into underground disposal wells.


Earthquake activity near the Cushing hub has alarmed federal scientists and officials at the U.S. Department of Homeland Security.

By SETH BORENSTEIN, KELLY P. KISSEL and SEAN MURPHY Associated Press | Updated: Mon, Jan 18, 2016

Oklahoma residents are talking about the big one as man-made earthquakes get stronger, more frequent and closer to major population centers. But in Kansas, people are feeling on firmer ground though no one is ready to declare victory.

Crowd fills House chamber at Oklahoma Capitol hearing to discuss increase in earthquakes


By Paul Monies Business Writer pmonies@oklahoman.com | Updated: Fri, Jan 15, 2016



Oklahomans packed the state House chamber Friday to take part in a hearing on the increased number of earthquakes in the state.

Residents express frustrations during Edmond earthquake forum

By Paul Monies Business Writer pmonies@oklahoman.com | Updated: Thu, Jan 14, 2016



Dozens of concerned Edmond residents worried about the immediate and cumulative effects of earthquakes spoke at a forum Thursday evening, with some calling for a moratorium on the use of saltwater disposal wells from oil and gas drilling.


Oklahoma Corporation Commission limits 27 disposal wells following Fairview earthquakes

By Paul Monies Business Writer pmonies@oklahoman.com | Published: Wed, Jan 13, 2016

The Oklahoma Corporation Commission said Wednesday it has asked operators of 27 saltwater disposal wells in the Fairview area to limit volumes following an outbreak of seismic activity. Regulators also said they're looking closely at recent winter storms in the area that knocked out power to...

Corporation Commission, SandRidge working on disposal well, earthquake settlement

By Paul Monies Business Writer pmonies@oklahoman.com | Updated: Tue, Jan 12, 2016



Oklahoma officials and SandRidge Energy Inc. are working on a possible settlement that could resolve a month-long dispute over whether the energy company should voluntarily shut down saltwater disposal wells in an area of recent earthquake activity. "Talks are underway,"